THE RHAPHIDOPHORIDAE (ORTHOPTERA) OF AUSTRALIA

4. A New Genus from South Australia

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Synopsis

A new genus *Novotettix* n.g. is erected, and the new species *Novotettix naracoortensis* n.sp. is described from limestone caves in south-eastern South Australia.

Introduction

A new monotypic genus *Novotettix* n.g., belonging to the family Rhaphidophoridae, is recorded here from Naracoorte in south-eastern South Australia. The new species, *Novotettix naracoortensis* n.sp., is placed in this genus.

The caves at Naracoorte are formed in Oligocene Gambier marine limestone, and occur at an altitude of about 200 feet above sea level. Twenty-eight caves are known, covering an area of 15 miles (Sexton, 1965). *N. naracoortensis* has been collected from Alexandra Cave and Victoria Cave on the South Australian Tourist Bureau Reserve. Specimens have also been taken in Haystall Cave, Corner Fence Cave, and Smoke Cave at Joanna, a district 9–10 miles south-south-east of the town of Naracoorte, and about four miles from the Tourist Reserve.

In both Alexandra and Victoria Caves temperatures range from 62°–64°F and relative humidity from 89–94%. Similar temperatures have been recorded from caves containing Rhaphidophorids in western Victoria and on the Nullarbor Plain. These temperatures are considerably higher than those recorded from caves in south-eastern Australia, where the range is from 49°–58°F, and the average temperature 54°–56°F (Richards, 1966). At Waitomo Caves in New Zealand, the highest temperature at which Rhaphidophorids could carry out their normal activities was found to be 60°F (Richards, 1965). Average cave temperatures there ranged from 53°–58°F. The southern Australian caves are the warmest habitats so far recorded in Australasia which support colonies of Rhaphidophoridae. The higher temperatures may be attributed to the low altitudes at which the caves occur.

Alexandra Cave contains a colony of over 1500 *N. naracoortensis*, in contrast to the rather sparsely populated caves in south-eastern Australia. About two-thirds of the insects occur on the walls 100 feet inside the entrance, and the remainder extend another 70 feet or more into the cave. The Rhaphidophorids share the cave with a fauna of carabids, pterostichids, isopods, two species of blattids, and two species of spiders. The very large number of Rhaphidophorids present may be accounted for by the absence of predators such as bats and rats. The Bat Cave, a short distance from Alexandra Cave, has a large colony of the bent-winged bat, *Miniopterus schreibersii* (Kuhl), but no *N. naracoortensis* have been observed in this cave. In Tasmanian caves, where no bats occur, large colonies of Rhaphidophoridae are also present. This dissociation of cave crickets and bats is quite the exception to the rule in caves throughout Australia.

N. naracoortensis is one of the larger of the Australian Rhaphidophoridae. Sexual dimorphism is strongly developed, males being larger than females. An adult male may reach a length of up to 18 cm. from the tip of its antennae to its hind tarsi.

The life history follows a similar pattern to that observed in other Rhaphidophorids, both in Australia and New Zealand (Richards, 1961, 1966). In late December and January adults appear. Mating and oviposition continue throughout the autumn.

The locomotor activity rhythm of *N. naracoortensis* has recently been discussed, and the similarity of its behaviour to that of New Zealand species noted (Richards, 1965).

This new genus *Novotettix* does not show any close affinities with other Australian Rhaphidophorid genera so far studied.

Genus Novotettix, n.g.

Body sparsely clothed with short setae. Legs long and slender. Antennae very long and tapering, almost touching at their bases; scape about three times as large as pedicel, which is narrower than scape, but broader than other segments; from segment four onwards segments subequal in length, but steadily decreasing in size; all segments thickly clothed with short setae. A single median ocellus present. Fastigium rising abruptly, grooved medianly and longitudinally. Maxillary palps with third and fourth segments subequal in length. Fore coxa unarmed. All femora sulcate ventrally. Apical spines on femora, tibiae, proximal segments one and two of hind tarsi constant in number. Fore femur bears two apical spines beneath, one prolateral and one retrolateral; fore tibia bears four apical spines, one above and one beneath both prolaterally and retrolaterally; fore tarsus unarmed. Mid femur bears two apical spines beneath, one prolateral and the other retrolateral; mid tibia bears four apical spines, one above and one beneath both prolaterally and retrolaterally; mid tarsus unarmed. Hind femur bears one prolateral apical spine beneath; hind tibia bears a pair of long apical spurs above, a pair of subapical spines above, a pair of short apical spurs beneath and a pair of subapical spines beneath, one from each pair being prolateral and the other retrolateral; two proximal segments of hind tarsus each bear two apical spines above, one prolateral and one retrolateral; other two segments unarmed. Subgenital plate of female trilobed, each lobe rounded apically. Subgenital plate of male triangulate.

Type species for the genus: *Novotettix naracoortensis* n.sp.

Novotettix naracoortensis, n.sp.

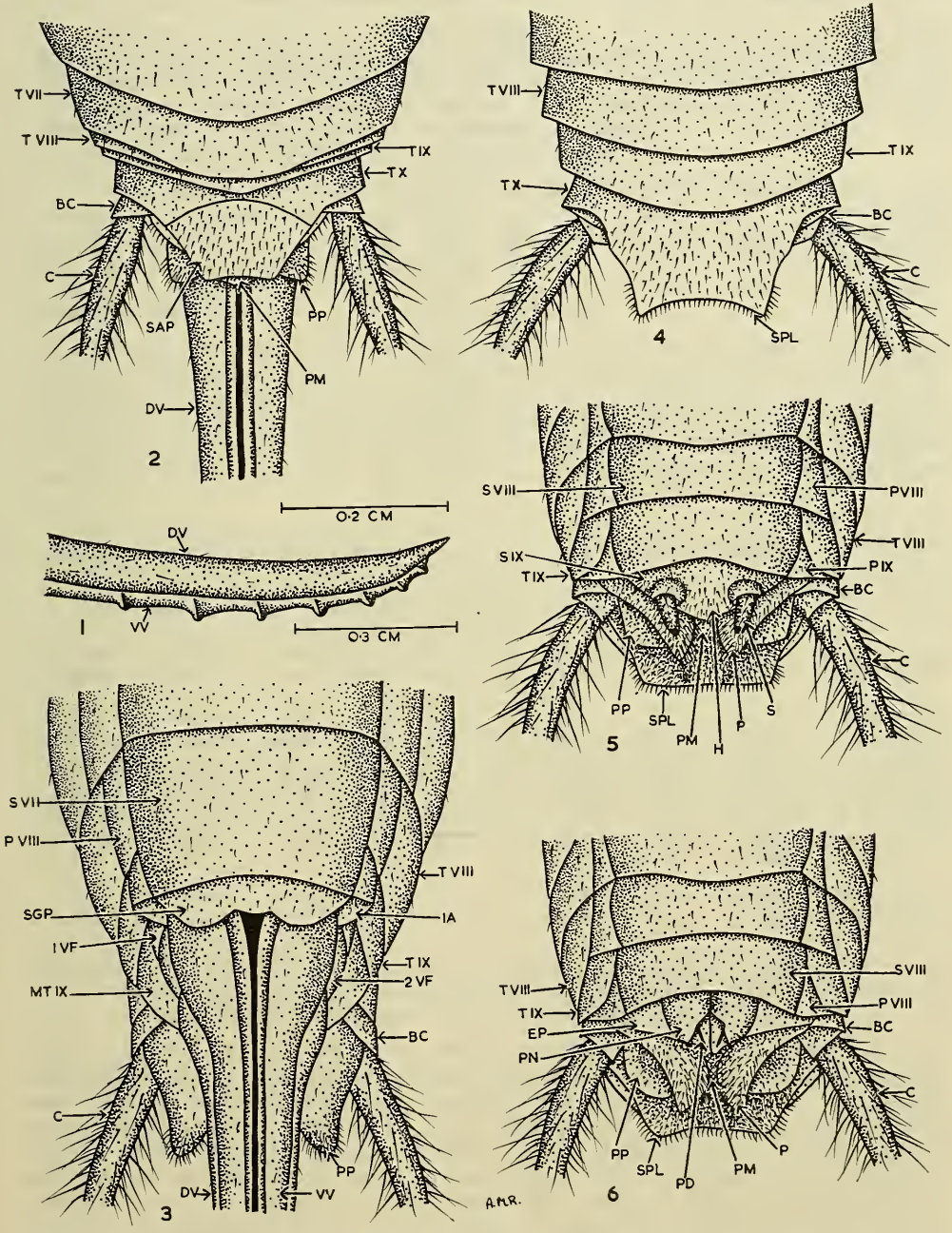
(Text-fig. 1. Figures 1–6)

Colour.—Basic colour ochreous with pronotum, mesonotum, metanotum and abdominal terga irregularly mottled with light brown; femora and tibiae banded or mottled with light brown and ochreous; all tarsi ochreous; antennae light brown; ovipositor light reddish brown.

Body.—Length up to 16 mm. in male, and 17 mm. in female. Surface of body sparsely clothed with setae. Antennae broken. Fastigium longer than high. Ovipositor 0·9 length of body; ventral valves armed distally 0·3 of total length to apex with seven well developed teeth (Fig. 1).

Antennae.—As in generic description. Third segment in male on dorsal aspect 2·6 as long as pedicel, and on ventral aspect 2·1 as long; in female on dorsal aspect 1·6 as long as pedicel, and on ventral aspect 1·3 as long. Sexual dimorphism present, male possessing longer, stouter antennae than female. No spines present on flagellum of either male or female.

Legs.—Fore and mid legs subequal in length, with hind leg 1·7 length of fore and mid legs. Sexual dimorphism is shown by fore, mid and hind legs of female being 0·8 as long as male. Hind femora, all tibiae and proximal two segments of hind tarsi armed with variable numbers of linear spines



Text-fig. 1.—*Novotettix naracoortensis* n.sp. 1, Distal portion of ovipositor showing teeth on ventral valve; 2, Female genitalia, dorsal view; 3, Female genitalia, ventral view; 4, Male genitalia, dorsal view; 5, Male genitalia, ventral view; 6, Male genitalia, ventral view, subgenital plate removed to expose structures beneath.

(Table 1). No spines on fore or mid femora and tarsi. Spines on hind femur of female fewer in number than those on hind femora of male. Apical spines constant in number as in generic description. Length of proximal segment of hind tarsus subequal with other three segments together. Ratio of length of legs to length of body: Fore leg, male 2·6 : 1; female 2 : 1. Mid leg, male 2·6 : 1; female 2 : 1. Hind leg, male 4·6 : 1; female 3·3 : 1.

TABLE 1

Variability in Number of Linear Spines on the Legs of 25 Specimens of Novotettix naracoortensis n.sp.

		Arith. Mean		No. of Specimens		Std. Dev.		Range (or Distribution)	
		L.	R.	L.	R.	L.	R.	L.	R.
Fore Femur Inf.	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Fore Tibia Inf.	Pro.	3·2	3·2	25	25	0·6	0·6	2–4	2–4
	Retro.	4·0	4·0	25	25	–	–	3(2), 4(23)	3(2), 4(23)
Fore Tarsus	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Mid Femur Inf.	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Mid Tibia Sup.	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Mid Tibia Inf.	Pro.	3·7	3·7	25	25	0·5	0·5	3(7), 4(18)	2–4
	Retro.	4·0	3·8	25	25	0·3	0·5	3–5	3–5
Mid Tarsus	Pro.	0	0	25	25	0	0	0	0
	Retro.	0	0	25	25	0	0	0	0
Hind Femur Inf. ♂	Pro.	13·0	14·1	14	14	2·4	3·1	9–17	8–21
	Retro.	16·1	17·9	14	14	4·0	3·6	9–25	13–28
Hind Femur Inf. ♀	Pro.	7·7	8·1	11	10	2·7	2·0	5–13	4–12
	Retro.	7·2	7·8	11	10	2·4	2·3	3–11	4–11
Hind Tibia Sup.	Pro.	63·6	62·6	25	24	4·1	6·6	57–72	48–75
	Retro.	68·9	67·7	25	24	8·1	6·6	55–81	59–83
Hind Tarsus 1 Sup.	Pro.	8·8	8·4	25	24	1·2	1·3	6–11	6–11
	Retro.	8·8	8·5	25	24	1·9	1·6	6–15	6–11
Hind Tarsus 2 Sup.	Pro.	3·1	3·0	25	24	0·7	0·7	2–5	2–4
	Retro.	2·8	3·0	25	24	0·6	0·8	2–4	2–5

Arith. Mean, Arithmetic Mean; Inf., Inferior; L., Left leg; Mid., Middle; Pro., Prolateral; R., Right leg; Retro., Retrolateral; Std. Dev., Standard Deviation; Sup., Superior.
(Figures in parentheses represent number of specimens)

Genitalia.—FEMALE: Suranal plate, Fig. 2 (SAP), concave laterally, distal margin slightly emarginate; whole plate thickly clothed with setae. Subgenital plate, Fig. 3 (SGP), distal margin trilobed, each lobe rounded apically, two lateral lobes 0·25 longer than median lobe; whole plate sparsely clothed with setae. MALE: Suranal plate, Fig. 4 (SPL), convex laterally, distal margin emarginate and clothed with setae; rest of plate thickly clothed with setae on dorsal and ventral surfaces; on ventral surface disto-lateral regions slightly raised into two lobes. Subgenital plate, Fig. 5 (H), triangulate, 2·5 wider than long, sparsely clothed with setae. Two styli, Fig. 5 (S), short, broad, conical, thickly clothed with setae, length of styli being 0·7 length of sternite IX (S IX). Parameres, Figs 5, 6 (P), elongate, tapering to a point, retrolateral

margin concave, prolateral margin convex, whole plate 2·7 longer than wide, distal portion of paramere thickly clothed with long and short setae. Pseudosternite, Fig. 6 (PD), 1·5 wider than long, convex laterally, tapering distally to a truncated apex. Penis, Fig. 6 (PN), two-lobed, each lobe subequal in width to length. Paraprocts, Figs 5, 6 (PP), crescent-shaped, twice as long as wide, sparsely clothed with setae.

Locality.—In limestone caves, Naracoorte, South Australia. Alexandra Cave (S4) (type locality), coll. A. M. Richards, 1964 ; G. F. Gross, 1958 ; E. Hamilton-Smith, 1956, 1958, 1961, 1962 ; Haystall Cave (S34), coll. P. F. Aitken, 1962 ; Smoke Cave (S71), coll. P. F. Aitken, 1962 ; Corner Fence Cave (S35), coll. P. F. Aitken, 1962 ; Victoria Cave (S2), coll. W. Hill, 1957 ; Cave two miles east of Naracoorte, coll. unknown, 1957.

Types.—Holotype male, allotype female, and two paratypes (male and female) in National Insect Collection, C.S.I.R.O., Canberra. Four paratypes (two males and two females) in South Australian Museum Collection, Adelaide. Two paratypes (male and female) in Australian Museum Collection, Sydney.

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Index to Text-figure

BC, basal segment of cercus ; C, cercus ; DV, dorsal valve ; EP, endoparamere ; H, subgenital plate, male ; IA, intersegmental apodeme ; MT IX, membrane of tergite IX ; P, paramere (ectoparamere) ; P VIII, P IX, pleurite VIII, IX ; PD, pseudosternite ; PM, perianal membrane ; PN, penis ; S, stylus ; S VII, S VIII, S IX, sternite VII, VIII, IX ; SAP, suranal plate, female ; SGP, subgenital plate, female ; SPL, suranal plate, male ; T VII, T VIII, T IX, T X, tergite VII, VIII, IX, X ; 1 VF, first valvifer ; 2 VF, second valvifer; VV, ventral valve.